REMARKS

The Office Action mailed April 19, 2005 has been carefully reviewed and the following remarks have been made in consequence thereof.

Claims 1, 4, 7, 12, and 19-35 are pending in this application. Claims 1, 4, 7, 12, and 19-35 are rejected.

The objection to Claim 4 is respectfully traversed. Specifically Claim 4 has been amended to depend from Claim 22.

The rejection of Claims 4, 19-21, and 24 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention is respectfully traversed. Specifically, Claim 19 has been amended to recite "a method of operating a servo system having an initial level of aggressiveness for responding to a collision and a predetermined desired level of aggressiveness for responding to an input control signal, said method comprising...reducing the level of aggressiveness for responding to the collision...maintaining the desired level of aggressiveness for responding to the input control signal." The initial level of aggressiveness for responding to a collision may be, for example, an "as found," "off-the-shelf," or pre-set level of aggressiveness that is not necessarily "set." Applicants respectfully submit that Claim 19 meets the requirements of 35 U.S.C. § 112, second paragraph.

Claims 4, 20, 21, and 24 depend from Claim 19. When the recitations of Claims 4, 20, 21, and 24 are considered in combination with the recitations of Claim 19, it is submitted that Claims 4, 20, 21, and 24 likewise meet the requirements of 35 U.S.C. § 112, second paragraph.

For the above reasons, it is requested that the rejection of Claims 4, 19-21, and 24 under 35 U.S.C. § 112, second paragraph be withdrawn.

The rejection of Claims 19-21, and 24 under 35 U.S.C. § 102(e) as being anticipated by Tomita (U.S. Patent No. 6,784,632) is respectfully traversed.

Tomita describes a positioning servo controller wherein the command response which is a response of a position deviation θ_1 with respect to the position command θ_r, and the disturbance response which is a response of a position deviation θ_2 with respect to the disturbance Td are calculated such that even when Kp, Kd, Ki, and Kg are adjusted so as to reduce the position deviation θ_2 caused by the influence of the disturbance Td, the position deviation θ_1 in the command response is also changed together with the position deviation θ_2 in the disturbance response because the transfer function from the position command θ_r to the position deviation θ_1 depends on only the same parameters. In another embodiment, the disturbance response in the transfer function of the positioning servo controller depends only on the denominator of the transfer function from the disturbance Td to θ_2. Notably, Tomita does not describe a collision as recited in Claim 19, but rather merely describes the disturbance as a deviation from a position.

Claim 19 recites a method of operating a servo system having an initial level of aggressiveness for responding to a collision and a predetermined desired level of aggressiveness for responding to an input control signal wherein the method includes "reducing the level of aggressiveness for responding to the collision...maintaining the desired level of aggressiveness for responding to the input control signal."

Tomita does not describe or suggest a method of operating a servo system as recited in Claim 19. Rather, in contrast to the present invention Tomita describes a transfer function of a positioning servo controller wherein a disturbance response depends only on the denominator of the transfer function from the disturbance Td to θ_2, but Tomita does not describe or suggest reducing the level of aggressiveness for responding to the collision, and maintaining the desired level of aggressiveness for responding to the input control signal. Accordingly, for at least the above reasons Applicants respectfully submit Claim 19 is patentable over Tomita.

Claims 20, 21, and 24 depend from Claim 19. When the recitations of Claims 20, 21, and 24 are considered in combination with the recitations of Claim 19, it is submitted that Claims 20, 21, and 24 are likewise patentable over Tomita.

For the above reasons, it is requested that the rejection of Claims 19-21, and 24 as being anticipated by Tomita be withdrawn.

The rejection of Claims 1, 22, 23, and 25-29 under 35 U.S.C. § 103(a) as being unpatentable over Yim (U.S. Patent No. 5,723,965) in view of Arita et al. (U.S. Patent No. 5,440,213) "Arita" is respectfully traversed.

Yim describes a velocity control method for use in a servo motor having a disturbance eliminator. An electrical disturbance due to noise or an electromagnetic wave, and a mechanical disturbance due to vibration or dynamic characteristics are input to the control system. Such a disturbance is added to or subtracted from a control torque input or a feedback signal to thereby deteriorate a response performance and to further instabilize the system. A disturbance eliminator or a disturbance estimator is designed to minimize an influence due to such a disturbance. A velocity error is conversed into zero as closely as possible to enable an accurate velocity control. (Abstract) The object of the invention is to provide a velocity control method that makes it possible to converge a control error into zero as closely as possible all the time irrespective of a disturbance applied to a servo motor.

Arita describes a collision detecting method for detecting a collision between a driven body driven by a servomotor and an obstacle by using an observer (50) including blocks (51 to 54) having transfer functions Kt/J, K3, K4/S, 1/S, respectively, which depend individually on a torque constant, inertia, and parameters corresponding thereto, and a multiplier (61) having a transfer function (J•A) that is equivalent to the product of the inertia and a unit system conversion constant. An estimated disturbance torque (y) is obtained in accordance with a torque command (I) and an actual motor speed (.theta.) by means of the observer (50). When the estimated disturbance torque exceeds a threshold value (Ts) a comparator (62) transmits an alarm and stops the drive of the servomotor.

Applicant respectfully submits that the Section 103 rejection of the presently pending claims is not a proper rejection. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Yim nor Arita,

considered alone or in combination, describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicant respectfully submits that it would not be obvious to one skilled in the art to combine Yim with Arita, because there is no motivation to combine the references suggested in the art. Additionally, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicant's own teaching. Rather, only the conclusory statement that "[i]t would have been obvious to one with ordinary skill in the art at the time of the invention that the subtractor of Yim (Fig. 1, #16) determines whether a collision has occurred based on the teachings of Arita" suggests combining the disclosures.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck , 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is clearly based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention.

Moreover, and to the extent understood, no combination of Yim, or Arita describes or suggests the claimed combination and as such, the presently pending claims are patentably distinguishable from the cited combination. Specifically, independent Claim 1 recites a

method for detecting collisions between an obstacle and an electromechanical system having a mechanical output controlled by a servo system wherein the method includes "inputting a forcing function xi to the servo system to direct the mechanical output to move in an intended manner...generating a difference signal at a monitoring point M representing a difference between forcing function xi and a feedback signal dependent upon the mechanical output...injecting a feed forward signal into the servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M...processing said difference signal to detect a collision."

No combination of Yim or Arita describes or suggests the claimed combination. Specifically, Applicant respectfully submits that no combination of Yim and Arita describes or suggests injecting a feed forward signal into the servo system, wherein the feed forward signal is dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M. Rather, Yim describes electrical disturbance due to noise or an electromagnetic wave, and a mechanical disturbance due to vibration or dynamic characteristics, and Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds the threshold value of step. Accordingly, and for at least the reasons set forth above, Claim 1 is submitted as patentable over Yim in view of Arita.

Claims 22, 23, and 25 depend from independent Claim 1. When the recitations of Claims 22, 23, and 25 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 22, 23, and 25 likewise are patentable over Yim in view of Arita.

Claim 26 recites an apparatus including "a servo system...an electromechanical system having a mechanical output controlled by said servo system...said servo system configured to input a forcing function xi to the servo system to direct the mechanical output to move in an intended manner, generate a difference signal at a monitoring point M representing a difference between forcing function xi and a feedback signal dependent upon said mechanical output, and inject a feed forward signal into the servo system, said feed

forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M...said apparatus further configured to process said difference signal to detect a collision."

No combination of Yim or Arita describes or suggests the claimed combination. Specifically, Applicant respectfully submits that no combination of Yim and Arita describes or suggests a servo system configured to generate a difference signal at a monitoring point M representing a difference between a forcing function xi and a feedback signal that depends on the mechanical output, and to inject a feed forward signal into the servo system wherein the feed forward signal depends on the forcing function and is effective to increase a detection threshold for collision stimulus at monitoring point M. Rather, Yim describes electrical disturbance due to noise or an electromagnetic wave, and a mechanical disturbance due to vibration or dynamic characteristics, and Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds the threshold value of step. Accordingly, and for at least the reasons set forth above, Claim 26 is submitted as patentable over Yim in view of Arita. Accordingly, and for at least the reasons set forth above, Claim 26 is submitted as patentable over Yim in view of Arita.

Claims 27-29 depend from independent Claim 26. When the recitations of Claims 27-29 are considered in combination with the recitations of Claim 26, Applicants submit that dependent Claims 27-29 likewise are patentable over Yim in view of Arita.

For the reasons set forth above, Applicants request that the Section 103 rejection of Claims 1, 22, 23, and 25-29 be withdrawn.

The rejection of Claims 1, 25, 26, and 31 under 35 U.S.C. § 103(a) as being unpatentable over Rehm (U.S. Patent No. 2005/0057205) in view of Arita et al. (U.S. Patent No. 5,440,213) is respectfully traversed.

Arita is described above. Rehm describes a method and apparatus for use with a motor controller that receives a command velocity and that applies voltages to drive a motor at the command velocity, the apparatus comprising a dual inertia lost motion assembly

including a motor and a load couplable to the motor, the lost motion assembly characterized by at least some lost motion between the motor and the load, the motor and load together characterized by a total assembly inertia, an acceleration error determiner for generating an acceleration error that is the difference between a derivative of the command velocity and a motor acceleration value and a low pass acceleration error filter filtering the acceleration error and having a gain set as a percentage of the total assembly inertia, the acceleration error filter providing the filtered signal to the controller, the controller using the filtered signal to adjust the applied voltages.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Specifically, Rehm is cited for describing a velocity regulator wherein a velocity ω^* is processed by a derivative block 16 which generates a command acceleration value a^*. Acceleration value a^* is processed by an amplifier which multiplies acceleration value a^* by the combined or total motor/load inertia to generate a scaled

command acceleration value and Arita is merely cited for its teaching of comparing an estimated disturbance torque signal to a threshold value. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection be withdrawn.

If art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention. U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). In light of this standard, it is respectfully submitted that the cited art, as a whole, is not suggestive of the presently claimed invention. More specifically, Applicants respectfully submit that the combination of Rehm and Arita teaches away from the present invention.

Moreover, neither Rehm nor Arita, considered alone or in combination, describe or suggest the claimed invention. Specifically, Claim 1 recites method for detecting collisions between an obstacle and an electromechanical system having a mechanical output controlled by a servo system wherein the method includes inputting a forcing function x_i to the servo system to direct the mechanical output to move in an intended manner...generating a difference signal at a monitoring point M representing a difference between forcing function x_i and a feedback signal dependent upon the mechanical output...injecting a feed forward signal into the servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M...processing said difference signal to detect a collision."

Neither Rehm nor Arita, considered alone or in combination, describe or suggest a method for communicating aircraft and aircraft engine information as recited in Claim 1. More specifically, no combination of Rehm and Arita describes or suggests injecting a feed forward signal into the servo system, wherein the feed forward signal is dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M. Rather, in contrast to the present invention, Rehm describes an acceleration error determiner for generating an acceleration error that is the difference

between a derivative of the command velocity and a motor acceleration value and a low pass acceleration error filter, and Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds the threshold value of step. Accordingly, and for at least the reasons set forth above, Claim 1 is submitted as patentable over Rehm. Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Rehm in view of Arita.

Claim 25 depends from independent Claim 1. When the recitations of Claim 25 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 25 likewise is patentable over Rehm in view of Arita.

Claim 26 recites an apparatus including "a servo system...an electromechanical system having a mechanical output controlled by said servo system...said servo system configured to input a forcing function xi to the servo system to direct the mechanical output to move in an intended manner, generate a difference signal at a monitoring point M representing a difference between forcing function xi and a feedback signal dependent upon said mechanical output, and inject a feed forward signal into the servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M...said apparatus further configured to process said difference signal to detect a collision."

No combination of Rehm or Arita describes or suggests the claimed combination. Specifically, Applicant respectfully submits that no combination of Rehm and Arita describes or suggests a servo system configured to generate a difference signal at a monitoring point M representing a difference between a forcing function xi and a feedback signal that depends on the mechanical output, and to inject a feed forward signal into the servo system wherein the feed forward signal depends on the forcing function and is effective to increase a detection threshold for collision stimulus at monitoring point M. Rather, in contrast to the present invention, Rehm describes an acceleration error determiner for generating an acceleration error that is the difference between a derivative of the command velocity and a motor acceleration value and a low pass acceleration error filter, and Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds

the threshold value of step. Accordingly, and for at least the reasons set forth above, Claim 26 is submitted as patentable over Rehm in view of Arita.

Claim 31 depends from independent Claim 26. When the recitations of Claim 31 are considered in combination with the recitations of Claim 26, Applicants submit that dependent Claim 31 likewise is patentable over Rehm in view of Arita.

For the reasons set forth above, Applicants request that the Section 103 rejection of Claims 1, 25, 26, and 31 be withdrawn.

The rejection of Claim 30 under 35 U.S.C. § 103(a) as being unpatentable over Rehm (U.S. Patent No. 2005/0057205) in view of Arita et al. (U.S. Patent No. 5,440,213) and further in view of Tomita (U.S. Patent No. 6,784,632) is respectfully traversed.

Rehm, Arita, and Tomita are described above.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection

is based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Specifically, Rehm is cited for describing a velocity regulator wherein a velocity ω^* is processed by a derivative block 16 which generates a command acceleration value a*. Acceleration value a* is processed by an amplifier which multiplies acceleration value a* by the combined or total motor/load inertia to generate a scaled command acceleration value, Arita is merely cited for its teaching of comparing an estimated disturbance torque signal to a threshold value, and Tomita is cited for teaching feeding forward and input signal and injecting the input signal into a plurality of points in a servo system.. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection be withdrawn.

If art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention. U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). In light of this standard, it is respectfully submitted that the cited art, as a whole, is not suggestive of the presently claimed invention. More specifically, Applicants respectfully submit that the combination of Rehm, Arita, and Tomita teaches away from the present invention.

Moreover, no combination of Rehm, Arita, and Tomita, considered alone or in combination, describes or suggests the claimed invention. Specifically, Claim 26 recites an apparatus including "a servo system...an electromechanical system having a mechanical output controlled by said servo system...said servo system configured to input a forcing function xi to the servo system to direct the mechanical output to move in an intended manner, generate a difference signal at a monitoring point M representing a difference between forcing function xi and a feedback signal dependent upon said mechanical output, and inject a feed forward signal into the servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus

at monitoring point M...said apparatus further configured to process said difference signal to detect a collision."

No combination of Rehm, Arita, and Tomita, considered alone or in combination, describes or suggests the claimed combination. Specifically, Applicant respectfully submits that no combination of Rehm, Arita, and Tomita, describes or suggests a servo system configured to generate a difference signal at a monitoring point M representing a difference between a forcing function xi and a feedback signal that depends on the mechanical output, and to inject a feed forward signal into the servo system wherein the feed forward signal depends on the forcing function and is effective to increase a detection threshold for collision stimulus at monitoring point M. Rather, in contrast to the present invention, Rehm describes an acceleration error determiner for generating an acceleration error that is the difference between a derivative of the command velocity and a motor acceleration value and a low pass acceleration error filter, Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds the threshold value of step, and Tomita describes a speed feedforward controller and an acceleration feedforward controller. Accordingly, and for at least the reasons set forth above, Claim 26 is submitted as patentable over Rehm in view of Arita and further in view of Tomita.

Claim 30 depends from independent Claim 26. When the recitations of Claim 30 are considered in combination with the recitations of Claim 26, Applicants submit that dependent Claim 30 likewise is patentable over Rehm in view of Arita and further in view of Tomita.

For the reasons set forth above, Applicants request that the Section 103 rejection of Claim 30 be withdrawn.

The rejection of Claims 7 and 35 under 35 U.S.C. § 103(a) as being unpatentable over Rehm (U.S. Patent No. 2005/0057205) in view of Arita et al. (U.S. Patent No. 5,440,213) and further in view of Hazelton (U.S. Application No. 2001/0000974) is respectfully traversed.

Rehm and Arita are described above. Hazelton et al. describes a feedback loop for controlling a projection exposure apparatus. A microprocessor controller 120 receives

feedback signals from reticle stage 9 and wafer stage 14. An image of a circuit pattern of the reticle R within a rectangular slit-like illumination area 21 projects onto a wafer W via a projection optical system 13. Reticle stage 9 includes a coarse stage 110 and a fine stage 116 for fine position adjustments of reticle stage 9. The feedback signals received by controller 120 indicate the actual position of wafer stage 14, coarse stage 110, and fine stage 116. Controller 120 controls the movement of reticle stage 9 and wafer stage 14 according to the desired velocity, acceleration, and jerk profiles. Servo amplifiers 122 and 124 drive wafer stage 14 and reticle coarse stage 110 respectively. Controller 120 determines an error or difference between the desired position indicated by trajectory signal 115 and the actual position. Then, controller 120 sends a signal to amplifier 118 to actuate PZT 117 and fine stage 116 to move the reticle to the desired position. A feedforward controller 126 may also be incorporated. Notably, Hazelton does not describe nor suggest a radiation detector, but Rather, in contrast to the present invention, describes that a light source projects an image onto a wafer. Applicants respectfully submit that a wafer onto which light is projected can not fairly be equated with a radiation detector.

Applicant respectfully submits that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been an obvious to one of ordinary skill in the art to modify Rehm according to Arita and Hazelton. More specifically, it is respectfully submitted that a prima facie case of obviousness has not been established. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art, and not in the applicant's disclosure. As explained by the Federal Circuit, "the test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000), MPEP 2143. Moreover, the Federal Circuit has determined that:

> [i]t is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

In re Fritch, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). In the present case, neither a suggestion nor motivation to modify the Rehm apparatus, nor any reasonable expectation of success has been shown. Further, under Section 103, "it is impermissible...to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 USPQ 391, 393 (CCPA 1965). Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20 USPQ2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the cited art, nor any reasonable expectation of success has been shown.

Although it is asserted within the Office Action that Rehm teaches the present invention except for processing the difference signal to detect a collision, and a radiation source and a detector and that Arita teaches comparing a torque difference signal to a threshold value and if the difference signal is greater than the threshold value a collision is indicated, and that Hazelton teaches a servo system that controls an imaging system with a radiation source and radiation detector, no motivation nor suggestion to combine the cited art has been shown. Since there is no teaching nor suggestion in the cited art for the claimed combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Applicant respectfully submits that none of the art describes or suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of the source, the detector, and the object to be scanned to move in an intended manner, generate a difference signal at a monitoring point representing a difference between the forcing function and a feedback signal that depends on a mechanical output, injecting a feed forward signal into the servo system wherein the feed forward signal is dependent on the

forcing function and effective to increase a detection threshold for collision stimulus at the monitoring point, and process the difference signal to detect a collision. Specifically, Rehm is cited for describing a motor controller that receives a command velocity and generates voltages to drive a motor at the command velocity using total assembly inertia and an acceleration error, Arita is cited for describing comparing a torque difference signal to a threshold value and if the difference signal is greater than the threshold value a collision is indicated, and Hazelton is merely cited for a radiation source and a radiation detector. Of course, such a combination is impermissible, and for this reason alone, Applicant requests that the Section 103 rejection of Claims 7 and 35 be withdrawn.

Moreover, if art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention. U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). In light of this standard, it is respectfully submitted that the cited art, as a whole, is not suggestive of the presently claimed invention. More specifically, Applicant respectfully submits, as described above, that none of the art describes or suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of the source, the detector, and the object to be scanned to move in an intended manner, generate a difference signal at a monitoring point representing a difference between the forcing function and a feedback signal that depends on a mechanical output, injecting a feed forward signal into the servo system wherein the feed forward signal is dependent on the forcing function and effective to increase a detection threshold for collision stimulus at the monitoring point, and process the difference signal to detect a collision. Rather, Applicant submits that Arita teaches away from Rehm and Hazelton in that Arita describes collision detecting method that uses an estimated disturbance torque to determine a collision, and in contrast, Rehm describes a motor controller that drives a motor at a command velocity using the motor velocity, acceleration and inertia, but does not detect a collision, and Hazelton describes a single acceleration step and deceleration step in a relative positioning system that includes a light source but does not include a radiation detector. Accordingly, Applicant respectfully submits that the cited combination teaches away from the present invention, and as such, thus supports the

nonobviousness of the present invention. Consequently, the presently pending claims are submitted as patentably distinguishable from the cited combination.

In addition, and to the extent understood, no combination of Arita, Rehm, and Hazelton describes or suggests the claimed invention. Specifically, Claim 7 recites an imaging system that includes a radiation source...a radiation detector positioned to receive radiation emitted by said source...a servo system configured to position at least one of said source, said detector, and an object to be scanned...said imaging system configured to input a forcing function x_i to the servo system to direct at least one of said source, said detector, and said object to be scanned to move in an intended manner; generate a difference signal at a monitoring point M representing a difference between forcing function x_i and a feedback signal dependent upon a mechanical output; injecting a feed forward signal in said servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M; and process said difference signal to detect a collision."

No combination of Rehm, Arita, and Hazelton describes nor suggests an imaging system as recited in Claim 7. Specifically, no combination of Rehm, Arita, and Hazelton describes nor suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of said source, said detector, and said object to be scanned to move in an intended manner; generate a difference signal at a monitoring point M representing a difference between forcing function x_i and a feedback signal dependent upon a mechanical output; injecting a feed forward signal in said servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M; and process said difference signal to detect a collision. Rather, in contrast to the present invention, Rehm describes an acceleration error determiner for generating an acceleration error that is the difference between a derivative of the command velocity and a motor acceleration value and a low pass acceleration error filter, and Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds the threshold value of step, and Hazelton describes, a single acceleration step and deceleration step in a relative positioning system that includes a

light source but does not include a radiation detector. Accordingly, for at least the reasons set forth above, Claim 7 is submitted to be patentable over Rehm in view of Arita et al., and further in view of Hazelton.

Claim 35 depends from independent Claim 7. When the recitations of Claim 35 are considered in combination with the recitations of Claim 7, Applicant submits that Claim 35 likewise is patentable over Rehm in view of Arita et al., and further in view of Hazelton.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 7 and 35 be withdrawn.

The rejection of Claim 34 under 35 U.S.C. § 103(a) as being unpatentable over Rehm (U.S. Patent No. 2005/0057205), Arita et al. (U.S. Patent No. 5,440,213), Hazelton (U.S. Application No. 2001/0000974) and further in view of Tomita (U.S. Patent No. 6,784,632) is respectfully traversed.

Rehm, Arita, Hazelton, and Tomita are described above.

Applicant respectfully submits that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been an obvious to one of ordinary skill in the art to modify Rehm according to Arita, Hazelton, and Tomita. More specifically, it is respectfully submitted that a prima facie case of obviousness has not been established. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art, and not in the applicant's disclosure. As explained by the Federal Circuit, "the test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000), MPEP 2143. Moreover, the Federal Circuit has determined that:

> [i]t is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

In re Fritch, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). In the present case, neither a suggestion nor motivation to modify the Rehm apparatus, nor any reasonable expectation of success has been shown. Further, under Section 103, "it is impermissible...to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 USPQ 391, 393 (CCPA 1965). Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20 USPQ2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the cited art, nor any reasonable expectation of success has been shown.

Although it is asserted within the Office Action that Rehm teaches the present invention except for processing the difference signal to detect a collision, a radiation source and a detector, and injecting the feedforward signal into a plurality of points in the servo system and that Arita teaches comparing a torque difference signal to a threshold value and if the difference signal is greater than the threshold value a collision is indicated, Hazelton teaches a servo system that controls an imaging system with a radiation source and radiation detector and Tomita teaches feeding forward an input signal and injecting the input signal into a plurality of points in a servo system, no motivation nor suggestion to combine the cited art has been shown. Since there is no teaching nor suggestion in the cited art for the claimed combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Applicant respectfully submits that none of the art describes or suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of the source, the detector, and the object to be scanned to move in an intended manner, generate a difference signal at a monitoring point representing a difference between the

forcing function and a feedback signal that depends on a mechanical output, injecting a feed forward signal into the servo system wherein the feed forward signal is dependent on the forcing function and effective to increase a detection threshold for collision stimulus at the monitoring point, and process the difference signal to detect a collision. Such a combination is impermissible, and for this reason alone, Applicant requests that the Section 103 rejection of Claims 7 and 35 be withdrawn.

Moreover, if art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention. U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). In light of this standard, it is respectfully submitted that the cited art, as a whole, is not suggestive of the presently claimed invention. More specifically, Applicant respectfully submits, as described above, that none of the art describes or suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of the source, the detector, and the object to be scanned to move in an intended manner, generate a difference signal at a monitoring point representing a difference between the forcing function and a feedback signal that depends on a mechanical output, injecting a feed forward signal into the servo system wherein the feed forward signal is dependent on the forcing function and effective to increase a detection threshold for collision stimulus at the monitoring point, and process the difference signal to detect a collision. Rather, Applicant submits that Arita teaches away from Rehm and Hazelton in that Arita describes collision detecting method that uses an estimated disturbance torque to determine a collision, and in contrast, Rehm describes a motor controller that drives a motor at a command velocity using the motor velocity, acceleration and inertia, but does not detect a collision, and Hazelton describes a single acceleration step and deceleration step in a relative positioning system that includes a light source but does not include a radiation detector. Accordingly, Applicant respectfully submits that the cited combination teaches away from the present invention, and as such, thus supports the nonobviousness of the present invention. Consequently, the presently pending claims are submitted as patentably distinguishable from the cited combination.

In addition, and to the extent understood, no combination of Arita, Rehm, and Hazelton describes or suggests the claimed invention. Specifically, Claim 7 recites an imaging system that includes a radiation source...a radiation detector positioned to receive radiation emitted by said source...a servo system configured to position at least one of said source, said detector, and an object to be scanned...said imaging system configured to input a forcing function x_i to the servo system to direct at least one of said source, said detector, and said object to be scanned to move in an intended manner; generate a difference signal at a monitoring point M representing a difference between forcing function x_i and a feedback signal dependent upon a mechanical output; injecting a feed forward signal in said servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M; and process said difference signal to detect a collision."

No combination of Rehm, Arita, Hazelton, and Tomita describes nor suggests an imaging system as recited in Claim 7. Specifically, no combination of Rehm, Arita, Hazelton, and Tomita describes nor suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of said source, said detector, and said object to be scanned to move in an intended manner; generate a difference signal at a monitoring point M representing a difference between forcing function x_i and a feedback signal dependent upon a mechanical output; injecting a feed forward signal in said servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M; and process said difference signal to detect a collision. Rather, in contrast to the present invention, Rehm describes an acceleration error determiner for generating an acceleration error that is the difference between a derivative of the command velocity and a motor acceleration value and a low pass acceleration error filter, and Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds the threshold value of step, Hazelton describes, a single acceleration step and deceleration step in a relative positioning system that includes a light source but does not include a radiation detector, and Tomita describes a speed feedforward controller and an acceleration feedforward controller.

Accordingly, for at least the reasons set forth above, Claim 7 is submitted to be patentable over Rehm, Arita et al., Hazelton, and further in view of Tomita.

Claim 34 depends from independent Claim 7. When the recitations of Claim 34 are considered in combination with the recitations of Claim 7, Applicant submits that Claim 34 likewise are patentable over Rehm, Arita et al., Hazelton, and further in view of Tomita.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claim 34 be withdrawn.

The rejection of Claims 7, 12, 32, 33, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Yim (U.S. Patent No. 5,723,965) in view of Arita et al. (U.S. Patent No. 5,440,213) and Hazelton (U.S. Application No. 2001/0000974) is respectfully traversed.

Arita and Hazelton are described above. Yim describes a velocity control method for use in a servo motor having a disturbance eliminator. Although unknown disturbances are input to the control system, a velocity error is conversed into zero as closely as possible to enable an accurate velocity control. (Abstract) However, Yim is not concerned with collisions between an obstacle and an electromechanical system, and thus does not teach or suggest making the injected signal both dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at a monitoring point M, and processing the difference signal to detect a collision.

Applicant respectfully submits that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been an obvious to one of ordinary skill in the art to modify Yim according to Arita and Hazelton. More specifically, it is respectfully submitted that a prima facie case of obviousness has not been established. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art, and not in the applicant's disclosure. As explained by the Federal Circuit, "the test for an

implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000), MPEP 2143. Moreover, the Federal Circuit has determined that:

> [i]t is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

In re Fritch, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). In the present case, neither a suggestion nor motivation to modify the Yim apparatus, nor any reasonable expectation of success has been shown. Further, under Section 103, "it is impermissible...to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 USPQ 391, 393 (CCPA 1965). Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20 USPQ2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the cited art, nor any reasonable expectation of success has been shown.

Although it is asserted within the Office Action that Yim teaches the present invention except for processing the difference signal to detect a collision, and a radiation source and a detector and that Arita teaches comparing a torque difference signal to a threshold value and if the difference signal is greater than the threshold value a collision is indicated, and that Hazelton teaches a servo system that controls an imaging system with a radiation source and radiation detector, no motivation nor suggestion to combine the cited art has been shown. Since there is no teaching nor suggestion in the cited art for the claimed combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Applicant respectfully submits that none of the art describes or suggests an

imaging system configured to input a forcing function x_i to the servo system to direct at least one of the source, the detector, and the object to be scanned to move in an intended manner, generate a difference signal at a monitoring point representing a difference between the forcing function and a feedback signal that depends on a mechanical output, injecting a feed forward signal into the servo system wherein the feed forward signal is dependent on the forcing function and effective to increase a detection threshold for collision stimulus at the monitoring point, and process the difference signal to detect a collision. Specifically, Yim is cited for describing a velocity controller that includes a proportional controller that calculates the torque for the servo motor to reach a desired velocity and a feedforward controller that differentiates a target velocity input value to determine an angular accelerating velocity, Arita is cited for describing comparing a torque difference signal to a threshold value and if the difference signal is greater than the threshold value a collision is indicated, and Hazelton is merely cited for a radiation source and a radiation detector. Of course, such a combination is impermissible, and for this reason alone, Applicant requests that the Section 103 rejection of Claims 7, 12, 32, 33, and 35 be withdrawn.

Moreover, if art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention. U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). In light of this standard, it is respectfully submitted that the cited art, as a whole, is not suggestive of the presently claimed invention. More specifically, Applicant respectfully submits, as described above, that none of the art describes or suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of the source, the detector, and the object to be scanned to move in an intended manner, generate a difference signal at a monitoring point representing a difference between the forcing function and a feedback signal that depends on a mechanical output, injecting a feed forward signal into the servo system wherein the feed forward signal is dependent on the forcing function and effective to increase a detection threshold for collision stimulus at the monitoring point, and process the difference signal to detect a collision. Rather, Applicant submits that Arita teaches away from Yim and Hazelton in that Arita describes collision detecting method that uses an estimated disturbance torque to determine a collision, and in contrast, Yim describes a velocity controller that

includes a proportional controller that calculates the torque for the servo motor to reach a desired velocity and a feedforward controller that differentiates a target velocity input value to determine an angular accelerating velocity, but does not detect a collision, and Hazelton describes a single acceleration step and deceleration step in a relative positioning system that includes a light source but does not include a radiation detector. Accordingly, Applicant respectfully submits that the cited combination teaches away from the present invention, and as such, thus supports the nonobviousness of the present invention. Consequently, the presently pending claims are submitted as patentably distinguishable from the cited combination.

In addition, and to the extent understood, no combination of Yim, Arita, and Hazelton describes or suggests the claimed invention. Specifically, Claim 7 recites an imaging system that includes a radiation source...a radiation detector positioned to receive radiation emitted by said source...a servo system configured to position at least one of said source, said detector, and an object to be scanned...said imaging system configured to input a forcing function x_i to the servo system to direct at least one of said source, said detector, and said object to be scanned to move in an intended manner; generate a difference signal at a monitoring point M representing a difference between forcing function x_i and a feedback signal dependent upon a mechanical output; injecting a feed forward signal in said servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for collision stimulus at monitoring point M; and process said difference signal to detect a collision."

No combination of Yim, Arita, and Hazelton describes nor suggests an imaging system as recited in Claim 7. Specifically, no combination of Yim, Arita, and Hazelton describes nor suggests an imaging system configured to input a forcing function x_i to the servo system to direct at least one of said source, said detector, and said object to be scanned to move in an intended manner; generate a difference signal at a monitoring point M representing a difference between forcing function x_i and a feedback signal dependent upon a mechanical output; injecting a feed forward signal in said servo system, said feed forward signal dependent upon the forcing function and effective to increase a detection threshold for

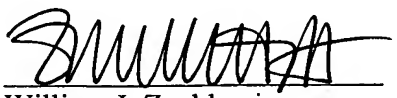
collision stimulus at monitoring point M; and process said difference signal to detect a collision. Rather, in contrast to the present invention, Yim describes a velocity controller that includes a proportional controller that calculates the torque for the servo motor to reach a desired velocity and a feedforward controller that differentiates a target velocity input value to determine an angular accelerating velocity, but does not detect a collision, Arita describes detecting a collision of the driven-body with an obstacle when the estimated disturbance torque exceeds the threshold value of step, and Hazelton describes, a single acceleration step and deceleration step in a relative positioning system that includes a light source but does not include a radiation detector. Accordingly, for at least the reasons set forth above, Claim 7 is submitted to be patentable over Yim in view of Arita et al., and further in view of Hazelton.

Claims 12, 32, 33, and 35 depend from independent Claim 7. When the recitations of Claims 12, 32, 33, and 35 are considered in combination with the recitations of Claim 7, Applicant submits that Claims 12, 32, 33, and 35 likewise are patentable over Yim in view of Arita et al., and further in view of Hazelton.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 7, 12, 32, 33, and 35 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



William J. Zychlewicz
Registration No. 51,366
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070